CLAIMS

I claim:

1). A method, comprising:

using hardware and software to perform continuous edge profiling on a program;

detecting profile phase transitions continuously; and

optimizing the program based upon the profile phase transitions and edge profile.

2). The method of claim 1, wherein using hardware and software comprises:

using software to insert edge profiling instructions and arrange profile data;

executing the program; and

using hardware to update profile, and signal phase transitions.

3). The method of claim 2, wherein using software to insert profiling instructions comprises modifying branch instructions to assign an identifier to one or more profiled edges, and to assign a value to an edge selection field.

4). The method of claim 3, wherein using software to insert profiling instructions further comprises inserting a profile identifier instruction when the profiled edge

does not have a branch instruction; an initialize profile instruction; and a set offset instruction.

5). The method of claim 2, wherein using hardware comprises translating edge profiling instructions into profile update operations.

6). The method of claim 4, further comprising:

loading a profile information register with a base address, an offset value, a trigger-counter, and a flag.

7). The method of claim 5, further comprising:

intercepting with hardware the profiling instructions;

generating a profile update operation; and

updating profile counters.

8). The method of claim 1, wherein detecting profile phase transitions continuously, comprises generating an interrupt signal by the hardware when the profile phase transition occurs.

9). The method of claim 8, further comprising:

determining if a program edge is hot, comprising

determining if the profiling instruction is executed, and

updating profiling counters associated with the profiling instruction;

determining if a cold edge becomes a hot edge, comprising

incrementing and decrementing trigger counters, and

detecting if trigger counters overflow and underflow;

preventing a false phase transition by detecting trigger counters underflow.

10). A system, comprising:

a processor pipeline configured to generate a profile ID for each profiled edge,

and generate profile update operations;

a profile information register coupled to the processor pipeline;

a first logic device configured to accept the profile update operations and profile ID to generate a memory buffer address;

a profile cache for accepting the buffer address connected to the first logic device; and

a second logic device connected to the profile cache configured to generate a phase transition interrupt signal,

wherein the system performs edge profiling on a program, detects profile phase transitions continuously, and optimizes the program based upon the profile phase transitions.

11). The system of claim 10, wherein the processor pipeline

executes the program;

intercepts profiling instructions and updates profile counters; and

updates profile phase transition trigger counters, and

signals phase transitions.

12). The system of claim 11, wherein the software inserts edge profiling instructions for modifying branch instructions to assign an identifier to one or more profiled edges, and to assign a value to an edge selection field.

13). The system of claim 12, wherein the software while inserting edge profiling instructions, also inserts a profile identifier instruction when the profiled edge does not have a branch instruction; an initialize profile instruction; and a set offset instruction.

14). The system of claim 11, wherein the processor translates edge profiling instructions into profile update operations.

15). The system of claim 13, wherein the processor pipeline loads a profile information register with a base address, an offset value, a trigger-counter, and a flag.

16). The system of claim 14, wherein the processor pipeline:

intercepts the profiling instructions;

generates a profile update operation; and

updates profile counters.

17). The system of claim 10, wherein the logic device generates an interrupt signal when the profile phase transition occurs.

18). The system of claim 17, wherein the processor:

determines if a program edge is hot, by determining if the profiling instruction is executed, updating profile counters associated with the profiling instruction, and determining if the trigger counters overflow;

determines if a cold edge becomes a hot edge, comprising

incrementing and decrementing trigger counters, and

detecting if trigger counters overflow and underflow;

preventing a false phase transition by detecting trigger counters underflow.

19). A computer-readable medium having stored thereon a plurality of instructions, said plurality of instructions when executed by a computer, cause said computer to perform:

using hardware and software to perform continuous edge profiling on a program;

detecting profile phase transitions continuously; and

optimizing the program based upon the profile phase transitions and edge profile.

20). The computer-readable medium of claim 19 having stored thereon additional instructions, said additional instructions when executed by a computer for using hardware and software to perform edge profiling on a program, cause said computer to further perform:

using software to insert edge profiling instructions and arrange profile data;

executing the program; and

using hardware to update profile phase transitions, and signal phase transitions.

21). The computer-readable medium of claim 20 having stored thereon additional instructions, said additional instructions when executed by a computer for using software to insert edge profiling instructions, cause said computer to further perform:

modifying branch instructions to assign an identifier to one or more profiled edges, and to assign a value to an edge selection field.

22). The computer-readable medium of claim 21 having stored thereon additional instructions, said additional instructions when executed by a

computer for using software to insert edge profiling instructions, cause said computer to further perform:

inserting a profile identifier instruction; when the profiled edge does not have a branch instruction, an initialize profile instruction, and a set offset instruction.

23). The computer-readable medium of claim 20, having stored thereon additional instructions, said additional instructions when executed by a computer for using hardware, cause said computer to further perform translating edge profiling instructions into profile update operations.

24). The computer-readable medium of claim 22 having stored thereon additional instructions, said additional instructions when executed by a computer, cause said computer to further perform:

loading a profile information register with a base address, an offset value, a trigger-counter, and a flag.

25). The computer-readable medium of claim 23 having stored thereon additional instructions, said additional instructions when executed by a computer, cause said computer to further perform:

intercepting with the hardware the profiling instructions;

generating a profile update operation; and

updating profile counters.

26). The computer-readable medium of claim 19 having stored thereon additional instructions, said additional instructions when executed by a computer for detecting profile phase transitions continuously, cause said computer to further perform:

generating an interrupt signal by the hardware when the profile phase transition occurs.

27). The computer-readable medium of claim 26 having stored thereon additional instructions, said additional instructions when executed by a computer for detecting profile phase transitions continuously, cause said computer to further perform:

determining if a program edge is hot, comprising

determining if the profiling instruction is executed, and

updating profile counters associated with the profiling instruction;

determining if a cold edge becomes a hot edge, comprising

incrementing or decrementing trigger counters, and

detecting if trigger counters overflow and underflow;

preventing a false phase transition by detecting trigger counters underflow.